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Proved Reserves of
Crude Oil, Natural Gas Liquids
and Natural Gas

December 31, 1956



VOLUME No. 11



Reports on
Proved Reserves of Crude Oil,
Natural Gas Liquids,
and Natural Gas
in the United States, and
Proved Reserves of Crude Oil
and Natural Gas Liquids
in Western Canada


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SUMMARY

THE American Petroleum Institute and the American Gas Association present herewith the annual reports of their respective reserves committees for the year 1956.

As in the case of the reports for the nine previous years, the crude oil reserves were estimated by the American Petroleum Institute committee, the natural gas reserves by the American Gas Association committee, and the natural gas liquid reserves—condensate, natural gasoline, and liquefied petroleum gases—by both committees.

These reports indicate the following comparative liquid hydrocarbon and gas reserves at the end of 1955 and 1956, and the production of liquid hydrocarbons and natural gas during those two years.

Reserves	December 31, 1955	December 31, 1956 (Barrels of 42 Gallons)	Change 1956 vs. 1955
Crude Oil	30,012,170,000	30,434,649,000	+ 422,479,000
Natural Gas Liquids	5,438,565,000	5,902,332,000	+ 463,767,000
Total Liquid Hydrocarbons	35,450,735,000	36,336,981,000	+ 886,246,000
		(Thousands of Cubic Feet)	
Natural Gas	223,697,445,000	237,774,569,000	+ 14,077,124,000
Production	1955	1956 (Barrels of 42 Gallons)	Change 1956 vs. 1955
Crude Oil	2,419,300,000	2,551,857,000	+ 132,557,000
Natural Gas Liquids	320,400,000	346,053,000	+ 25,653,000
Total Liquid Hydrocarbons	2,739,700,000	2,897,910,000	+ 158,210,000
		(Thousands of Cubic Feet)	
Natural Gas	10,118,118,000	10,907,926,000	+ 789,808,000

The gas production figures indicated above are net after deducting only the amount of gas returned to reservoirs for cycling and pressure maintenance. They therefore include the gas put into underground storage.

The separate detailed reports of the two committees follow.

Following these reports of the American Petroleum Institute and American Gas Association committees is a brief report on Proved Reserves of Crude Oil and Natural Gas Liquids in Canada as estimated for December 31, 1956 by the Central Reserves Committee of the Canadian Petroleum Association. The Canadian Committee has made every effort to place these estimates on a basis comparable with that used by the corresponding United States committees. It is through the courtesy of the Canadian Petroleum Association that those figures are included herewith.

Report of the American Petroleum Institute's Committee on Petroleum Reserves

TO THE BOARD OF DIRECTORS AMERICAN PETROLEUM INSTITUTE:

Your Committee on Petroleum Reserves herewith submits its annual report on proved liquid hydrocarbon reserves of the United States as of December 31, 1956. As will be recalled, beginning with our report for December 31, 1946, the estimates presented on proved liquid hydrocarbon reserves were expanded to include not only crude oil, but also all classes of natural gas liquids. (See definition of natural gas liquids as given by A.G.A. Committee in its report.) The figures on crude oil were prepared by the API Committee, and the figures on natural gas liquids were prepared by the A.G.A. Committee in cooperation with the API Committee. For the present report, the same procedure has been followed.

As of December 31, 1956, the committee estimates that the proved reserves of crude oil in the United States amounted to 30,434,649,000 barrels. The natural gas liquids totaled 5,902,332,000 barrels, making a grand total of 36,336,981,000 barrels. This is shown in the following tabulations which include in their respective states the offshore proved reserves in California, Louisiana and Texas.

TABLE 1
(a) CRUDE OIL—AMERICAN PETROLEUM INSTITUTE

(Barrels of 42 U. S. Gallons)

Total proved reserves of crude oil as of December 31, 1955	30,012,170,000
Revisions of previous estimates	+ 804,803,000
Extensions of old pools	1,702,311,000
New reserves discovered in 1956 in new fields and in new pools in old fields ..	<u>467,222,000</u>
Proved reserves added in 1956	<u>2,974,336,000</u>
Total proved reserves as of December 31, 1955 plus new proved reserves added in 1956	32,986,506,000
Less production during 1956*	<u>2,551,857,000</u>
Total proved reserves of crude oil as of December 31, 1956	30,434,649,000
Change in crude oil reserves during 1956	+422,479,000

**(b) NATURAL GAS LIQUIDS—AMERICAN GAS ASSOCIATION
AND AMERICAN PETROLEUM INSTITUTE**

(Barrels of 42 U. S. Gallons)

Total proved reserves of natural gas liquids as of December 31, 1955	5,438,565,000
Revisions of previous estimates and extensions of old pools	+ 715,764,000
New reserves discovered in 1956 in new fields and in new pools in old fields ..	94,056,000
Proved reserves added in 1956	809,820,000
Total proved reserves as of December 31, 1955 plus new proved reserves added in 1956	6,248,385,000
Less production during 1956*	346,053,000
Total proved reserves of natural gas liquids as of December 31, 1956	5,902,332,000
Change in Natural Gas Liquids reserves during 1956	+463,767,000

(c) TOTAL LIQUID HYDROCARBONS—A.P.I. & A.G.A.

(Tables 1a and 1b combined)

(Barrels of 42 U. S. Gallons)

Total proved reserves as of December 31, 1955	35,450,735,000
Revisions of previous estimates and extensions of old pools	+3,222,878,000
New reserves discovered in 1956 in new fields and in new pools in old fields ..	561,278,000
Proved reserves added in 1956	3,784,156,000
Total proved reserves as of December 31, 1955 plus new proved reserves added in 1956	39,234,891,000
Less production during 1956*	2,897,910,000
Total proved reserves of liquid hydrocarbons as of December 31, 1956	36,336,981,000
Change in Total Liquid Hydrocarbon reserves during 1956	+886,246,000

The estimates in this report, as in all previous annual reports of this committee, refer solely to proved or blocked-out reserves. They include only oil and natural gas liquids recoverable under existing economic and operating conditions.

* The 1956 production figures were compiled by the committee from records of actual production for whatever period such were available, with estimates for the remainder of the year. Any variance between the actual production, as later reported, and the figures used herein will be compensated for through revision when the following year's reserve report is compiled. These revisions have in the past been very small. Because, in each annual report by this committee, the production figure for the year is an estimate, as just explained, correct total cumulative production cannot be obtained by adding together the figures listed in successive reports of this committee, or in the columns marked "production" of Tables 5A and 5B.

The estimates made for this report by your committee do not include:

1. Oil* under the unproved portions of partly developed fields.
2. Oil in untested prospects.
3. Oil that may be present in unknown prospects in regions believed to be generally favorable.
4. Oil that may become available by fluid injection methods from fields where such methods have not yet been applied.
5. Oil that may become available through processing of natural gas.
6. Oil that can be made from oil shale, coal, or other substitute sources.

Proved reserves are both drilled and undrilled. The proved drilled reserves, in any pool, include the oil estimated to be recoverable by the production systems now in operation, whether with or without fluid injection, and from the area actually drilled up on the spacing pattern in effect in that pool. The proved undrilled reserves, in any pool, include reserves under undrilled spacing units which are so close, and so related, to the drilled units that there is every reasonable probability that they will produce when drilled.

This committee uses the term "fluid injection" to include (1) what is commonly called "pressure maintenance"; (2) cycling; and (3) secondary recovery in its original sense, namely, fluid injection applied relatively late in the development history of a reservoir (pool) with the purpose of stimulating petroleum production after recovery by primary methods of flowing or artificial lift has approached an economic limit. The reserves which may become available as a result of fluid injection are regarded as *proved only* after thorough testing by a pilot plant, or after operations of an installed fluid injection procedure has confirmed the anticipation of increased recovery.

In the case of new discoveries, both of new fields and of new pools (pays, reservoirs) in old fields, which are seldom fully developed in the first year and in fact for several years thereafter, the estimates of proved reserves necessarily represent but a part of the reserves which may ultimately be assigned to the new reservoirs discovered each year. For a one-well field, where development has not yet gone beyond the discovery well, the area assigned as proved is usually small in regions of complex geological conditions but may be larger where the geology is relatively simple. In a sparsely drilled pool the area between wells is considered to be proved only if the geological and engineering data assure that such area will produce when drilled. The total of new oil through discoveries estimated as proved in each year is comparatively small, because development is usually not extensive during the first year. The total of new oil through extensions, on the other hand, is comparatively large. As knowledge of the factors affecting production and reservoir performance becomes available, and as these factors are studied, reserves in older fields can be estimated with greater precision and revised accordingly. Therefore, the total quantity of the new proved reserves for the year includes the oil

* The word "Oil," unless defined as crude oil, is used in this report as equivalent to liquid hydrocarbons.

from discoveries and extensions, modified by revisions of previous estimates where new data have made better information available.

The committee again wishes especially to stress the fact that its estimates of proved reserves cannot be used in measuring the rate at which these reserves can be produced with or without physical waste. Oil cannot be produced from the permeable rocks in which it occurs at any desired rate, because the flow of oil through the pores of the oil-bearing rocks is definitely controlled by the physical factors of the reservoir. As a matter of fact, today's known oil can be recovered only over a period of many years and at gradually declining annual rates. This has been widely demonstrated by past performance under all kinds of operating conditions. Therefore, only incorrect conclusions as to the life of these reserves can be obtained by dividing these reserves by the current rate of production.

In Table 2 we show, in Column 1, the crude oil* reserves as of December 31, 1955. In Column 2 are the changes in these crude-oil estimates due to extensions and revisions. In Column 3 are the new reserves of crude oil discovered in 1956 in new fields and also in new pools (pays, reservoirs) in old fields. In Column 4 are shown the committee's figures on production of crude oil (see footnote on production following Table 1), and in Column 5 are shown the remaining reserves of crude oil as of December 31, 1956. Column 6 shows the changes in crude-oil reserves during 1956.

In Table 3, in Column 1, are shown the reserves of natural gas liquids (condensate,* natural gasoline and liquefied petroleum gases—see complete definition in AGA report) as of December 31, 1955. In Column 2 are the changes in these natural gas liquids estimates due to extensions and revisions. In Column 3 are the new reserves of natural gas liquids discovered in 1956, in new fields and also in new pools (pays, reservoirs) in old fields. In Column 4 are shown the figures on production of natural gas liquids, and in Column 5 are shown the remaining reserves of natural gas liquids as of December 31, 1956. Column 6 shows the changes in natural gas liquid reserves during 1956.

Table 4 is a consolidation of Tables 2 and 3, and shows the total liquid hydrocarbon reserves as of December 31, 1955 and 1956, with related data, by states.

For comparative purposes we append a summary (Tables 5A and 5B) of the overall figures contained in the committee's annual reports covering the period from 1937 to 1956, inclusive. Figures for 1935 and 1936, which were the first developed by the committee, are not available separately.

As in the past, this committee wishes to emphasize the fact that every effort has again been made to secure a fair, unprejudiced, and representative opinion. Each member in his district appointed a number of subcommittees to gather and study the necessary data. All previously determined factors pertaining to the various pools were examined and adjusted in the light of new information. The subcommittees which were largely responsible for the data

* The API Committee includes in its crude oil figures all condensate which comes out of the separator with the crude oil and is run with the crude as part of the crude oil stream. All other condensate is included by the Gas Reserves Committee in its figures on Natural Gas Liquids.

were comprised of geologists and petroleum engineers with long experience in this class of work. We wish to acknowledge the valuable assistance of all those who have cooperated in this undertaking.

Respectfully submitted,

THE COMMITTEE ON PETROLEUM RESERVES

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* Subcommittee Chairmen and Vice Chairmen.

TABLE 2

ESTIMATED PROVED RESERVES OF CRUDE OIL* IN THE UNITED STATES

(Barrels of 42 U. S. Gallons)

(API Committee)

	Proved Reserves as of December 31, 1955 (1)	Changes in Proved Reserves Due to Extensions (New Crude Oil) and Revisions During 1956 (2)	Proved Reserves Discovered in New Fields and in New Pools in Old Fields in 1956* (3)	§ Production During 1956 (4)	Proved Reserves as of December 31, 1956 (Column 1 + 2 + 3 less Column 4) (5)	Changes in Reserves During 1956 (Column 5 less Column 1) (6)
Alabama	20,604,000	19,897,000	—	2,964,000	37,537,000	16,933,000
Arkansas	329,539,000	12,089,000	3,947,000	27,849,000	317,726,000	(—)
California†	3,801,408,000	301,800,000	18,903,000	350,754,000	3,771,357,000	30,051,000
Colorado	334,003,000	82,965,000	5,202,000	58,420,000	363,750,000	29,747,000
Illinois	691,161,000	77,878,000	13,003,000	82,042,000	700,000,000	8,839,000
Indiana	61,458,000	17,589,000	956,000	12,275,000	67,728,000	6,270,000
Kansas	998,068,000	97,206,000	21,496,000	124,559,000	992,211,000	(—)
Kentucky	107,454,000	55,068,000	3,448,000	17,528,000	148,442,000	5,857,000
Louisiana†	3,255,287,000	574,741,000	115,387,000	269,996,000	3,675,419,000	40,988,000
Michigan	58,889,000	7,094,000	75,000	10,746,000	55,312,000	(—)
Mississippi	387,702,000	13,822,000	5,731,000	39,050,000	368,205,000	(—)
Montana	298,948,000	46,387,000	7,800,000	21,721,000	331,414,000	32,466,000
Nebraska	57,697,000	14,294,000	7,720,000	16,850,000	62,861,000	5,164,000
New Mexico	819,658,000	81,745,000	21,150,000	87,116,000	835,437,000	15,779,000
New York	42,943,000	—	—	2,747,000	40,196,000	(—)
North Dakota	185,532,000	11,947,000	11,110,000	12,755,000	195,834,000	10,302,000
Ohio	56,000,000	12,498,000	—	4,923,000	63,575,000	7,575,000
Oklahoma	2,016,045,000	175,697,000	29,867,000	211,811,000	2,009,798,000	(—)
Pennsylvania	93,344,000	49,587,000	—	8,231,000	134,700,000	41,356,000
Texas†	14,933,502,000	762,934,000	164,488,000	1,077,785,000	14,783,139,000	(—)
Utah	37,112,000	283,000	26,550,000	2,510,000	61,435,000	24,323,000
West Virginia	47,000,000	3,320,000	3,138,000	2,237,000	51,221,000	4,221,000
Wyoming	1,373,630,000	88,621,000	7,251,000	106,338,000	1,363,164,000	(—)
Miscellaneous‡	5,186,000	(—)	—	650,000	4,188,000	(—)
Total United States	30,012,170,000	2,507,114,000	467,222,000	2,551,857,000	30,434,649,000	422,479,000

* Only a limited area is assigned to each new discovery, even though the committee may believe that eventually a much larger area will produce; for, in this report, the concern is only with actually proved reserves.

† Under actual reserves.

‡ Under Miscellaneous are included Arizona, Florida, Missouri, Nevada, South Dakota, Tennessee and Virginia.

§ See footnote on page 3.

¶ See text for explanatory note on page 7.

TABLE 3

ESTIMATED PROVED RESERVES OF NATURAL GAS LIQUIDS IN THE UNITED STATES

(Includes condensate^b, natural gasoline and liquefied petroleum gases. See complete definition in A.G.A. gas report)
(Barrels of 42 U. S. Gallons)

	Proved Reserves as of December 31, 1955 (1)	Changes In Proved Reserves Due to Extensions (New Natural Gas Liquids) and Revisions During 1956 (2)	Proved Reserves Discovered In New Fields and in Old Fields in 1956* (3)	§ Production During 1956 (4)	Proved Reserves as of December 31, 1956 (Columns 1 + 2 + 3 less Column 4) (5)	Changes In Reserves During 1956 (Column 5 less Column 1) (6)
Alabama ^a	45,124,000	338,000	18,000	3,013,000	42,467,000	(—)
Arkansas	324,941,000	16,548,000	663,000	30,424,000	311,728,000	(—)
California†	12,511,000	(—)	—	837,000	11,545,000	(—)
Colorado	18,457,000	464,000	92,000	2,241,000	16,772,000	(—)
Illinois	132,000	17,000	5,000	21,000	133,000	1,000
Indiana	173,236,000	2,111,000	1,944,000	5,676,000	171,615,000	(—)
Kansas	8,675,000	291,000	145,000	1,860,000	7,251,000	(—)
Kentucky	935,950,000	98,628,000	23,589,000	43,225,000	1,014,942,000	78,992,000
Louisiana†	872,000	178,000	134,000	116,000	1,068,000	196,000
Michigan	57,876,000	(—)	1,421,000	3,079,000	56,003,000	(—)
Mississippi	6,857,000	1,550,000	—	262,000	8,145,000	1,288,000
Montana	6,436,000	436,000	183,000	551,000	6,504,000	68,000
Nebraska	342,207,000	84,574,000	2,489,000	15,171,000	414,099,000	71,892,000
New Mexico	1,557,000	120,000	13,000	21,000	1,669,000	112,000
Ohio	354,354,000	26,131,000	5,963,000	30,860,000	355,588,000	1,234,000
Oklahoma	3,024,000	178,000	89,000	124,000	3,167,000	143,000
Pennsylvania	3,045,361,000	476,364,000	57,037,000	198,873,000	3,379,889,000	334,528,000
Texas†	108,000	(—)	—	5,000	95,000	(—)
Utah	30,526,000	761,000	253,000	4,799,000	26,741,000	(—)
West Virginia	50,348,000	7,420,000	—	3,894,000	53,874,000	3,785,000
Wyoming	20,013,000	7,000	18,000	1,001,000	19,037,000	(—)
Miscellaneous‡						976,000
Total United States	5,438,565,000	715,764,000	94,056,000	346,053,000	5,902,332,000	463,767,000

* Only a limited area is assigned to each new discovery, even though the committee may believe that eventually a much larger area will produce; for, in this report, the concern is only with actually proved reserves.

† Includes off-shore reserves.

‡ Includes Alabama, Florida, and North Dakota.

§ See footnote on page 5.

|| Included in "Miscellaneous."

b See text for explanatory note on page 7

TABLE 4

ESTIMATED PROVED RESERVES OF LIQUID HYDROCARBONS IN THE UNITED STATES

(Barrels of 42 U. S. Gallons)

(API and A.G.A. Committees)

	Proved Reserves as of December 31, 1935 (1)	Changes in Proved Reserves Due to Extensions (of New Oil) and Revisions During 1936 (2)	Proved Reserves Discovered in New Fields in Old Fields in 1936 ^a (3)	Production During 1936 (4)	Proved Reserves as of December 31, 1936 (Column 1 + 2 + 3 less Column 4) (5)	Changes in Reserves During 1936 (Column 5 less Column 1) (6)
Alabama ^a	20,604,000	19,897,000	—	2,964,000	37,537,000	16,933,000
Arkansas	374,663,000	12,427,000	3,965,000	30,862,000	360,193,000	(—)
California†	4,126,349,000	318,348,000	19,566,000	381,178,000	4,083,085,000	(—)
Colorado	346,514,000	82,836,000	5,202,000	59,257,000	375,295,000	28,781,000
Illinois	709,618,000	78,342,000	13,095,000	84,283,000	716,772,000	7,154,000
Indiana	61,590,000	17,606,000	961,000	12,296,000	67,861,000	6,271,000
Kansas	1,171,304,000	99,317,000	23,440,000	130,235,000	1,163,826,000	(—)
Kentucky	116,129,000	55,359,000	3,593,000	19,388,000	155,693,000	39,564,000
Louisiana†	4,191,237,000	673,369,000	138,976,000	313,221,000	4,690,361,000	499,124,000
Michigan	59,761,000	7,272,000	209,000	10,862,000	56,380,000	(—)
Mississippi	445,578,000	13,607,000	7,132,000	42,129,000	424,208,000	(—)
Montana	305,805,000	47,937,000	7,800,000	21,983,000	339,559,000	33,754,000
Nebraska	64,133,000	14,730,000	7,903,000	17,401,000	69,365,000	5,232,000
New Mexico	1,161,865,000	166,319,000	23,639,000	102,287,000	1,249,536,000	87,671,000
New York ^a	42,943,000	—	—	2,747,000	40,196,000	(—)
North Dakota ^a	185,532,000	11,947,000	11,110,000	12,755,000	195,834,000	10,302,000
Ohio	57,557,000	12,618,000	13,000	4,944,000	65,244,000	7,687,000
Oklahoma	2,370,399,000	201,828,000	35,830,000	242,671,000	2,365,386,000	(—)
Pennsylvania	96,368,000	49,765,000	89,000	8,355,000	137,867,000	5,013,000
Texas†	17,978,863,000	1,239,298,000	221,525,000	1,276,658,000	18,163,028,000	184,165,000
Utah	37,220,000	275,000	26,550,000	2,515,000	61,530,000	24,310,000
West Virginia	77,526,000	4,081,000	3,391,000	7,036,000	77,962,000	436,000
Wyoming	1,423,978,000	96,041,000	7,251,000	110,232,000	1,417,038,000	(—)
Miscellaneous ^b	25,199,000	(—)	18,000	1,651,000	23,225,000	(—)
Total United States	35,450,735,000	3,222,878,000	561,278,000	2,897,910,000	36,336,981,000	886,246,000

* Only a limited area is assigned to each new discovery, even though the committee may believe that eventually a much larger area will produce; for, in this report, the concern is only with actually proved reserves.

† Includes off-shore reserves.

^a See footnote on page 5.

^b Crude Oil only.

^c Includes Alabama and North Dakota natural gas liquids; Arizona, Missouri, Nevada, South Dakota, Tennessee and Virginia crude; and Florida crude and natural gas liquids.

TABLE 5A
SUMMARY OF PROVED RESERVES AS REPORTED PRIOR TO 1946

(Barrels of 42 U. S. Gallons)

	NEW OIL ADDED DURING YEAR				*Production During Year (4)	Estimated Proved Reserves as of End of Year (Column 3 - 4) (5)	Increase Over Previous Year (6)
Through Revisions of Previous Estimates and Extensions to Known Fields (1)	Through Discoveries of New Fields and New Pools in Old Fields (2)	Total Through New Discoveries, Extensions, and Revisions (Columns 1 + 2) (3)					
1936	.....	.....	.....	.....	13,063,400,000	.....	.....
1937	2,792,790,000	928,742,000	3,721,532,000	1,277,664,000	15,507,268,000	2,443,868,000	2,443,868,000
1938	2,243,571,000	810,493,000	3,054,064,000	1,213,186,000	17,348,146,000	1,840,878,000	1,840,878,000
1939	2,058,455,000	340,667,000	2,399,122,000	1,264,256,000	18,483,012,000	1,134,866,000	1,134,866,000
1940	1,607,012,000	286,338,000	1,893,350,000	1,351,847,000	19,024,515,000	541,503,000	541,503,000
1941	1,538,989,000	429,974,000	1,968,963,000	1,404,182,000	19,589,296,000	564,781,000	564,781,000
1942	1,618,925,000	260,051,000	1,878,976,000	1,385,479,000	20,082,793,000	493,497,000	493,497,000
1943	1,202,368,000	282,418,000	1,484,786,000	1,503,427,000	20,064,152,000	(—) 18,641,000	(—) 18,641,000
1944	1,556,192,000	511,308,000	2,067,500,000	1,678,421,000	20,453,231,000	389,079,000	389,079,000
1945	1,690,315,000	419,984,000	2,110,299,000	1,736,717,000	20,826,813,000	373,582,000	373,582,000
December 31, 1945	Estimated Proved Reserves of Crude Oil Only (see note below)				19,941,846,000	.....	.....

NOTE: Up to and including its figures on proved reserves of petroleum, as of December 31, 1945, the committee combined under that heading the estimated proved reserves of cycle-plant and lease condensate. As of December 31, 1945, the reserves so included totaled 884,967,000 bbl. and as of December 31, 1944, there were 668,701,000 bbl. included. Beginning with the report of December 31, 1946, the figures in this table show crude oil and natural gas liquids. It is to be remembered that, previous to December 31, 1946, not all classes of natural gas liquids were included. For this reason the totals for crude oil and natural gas liquids, as herewith recorded for 1946, 1947 and 1948, are not comparable with the figures recorded for years prior to 1946.

* See footnote on page 5.

SUMMARY OF PROVED RESERVES AS REPORTED FOR 1946 AND THEREAFTER*

(Barrels of 42 U. S. Gallons)

	NEW OIL ADDED DURING YEAR				†Production During Year (4)	Estimated Proved Reserves as of End of Year (Column 3 - 4) (5)	Increase Over Previous Year (6)
	Through Revisions of Previous Estimates and Extensions to Known Fields (1)	Through Discoveries of New Fields and Extensions in Old Fields (2)	Total New Discoveries, Extensions, and Revisions (Columns 1 + 2) (3)				
CRUDE OIL ONLY							
1946	2,413,628,000	244,434,000	2,658,062,000	1,726,348,000	20,873,560,000	931,714,000	
1947	2,019,140,000	445,430,000	2,464,570,000	1,850,445,000	21,487,685,000	614,125,000	
1948	3,398,726,000	396,481,000	3,795,207,000	2,002,448,000	23,280,444,000	1,792,759,000	
1949	2,297,428,000	890,417,000	3,187,845,000	1,818,800,000	24,649,489,000	1,369,045,000	
1950	1,997,769,000	564,916,000	2,562,685,000	1,943,776,000	25,268,398,000	618,909,000	
1951	4,024,698,000	389,256,000	4,413,954,000	2,214,321,000	27,468,031,000	2,199,633,000	
1952	2,252,860,000	496,428,000	2,749,288,000	2,256,765,000	27,960,554,000	492,523,000	
1953	2,704,450,000	591,680,000	3,296,130,000	2,311,856,000	28,944,828,000	984,274,000	
1954	2,287,231,000	585,806,000	2,873,037,000	2,257,119,000	29,560,746,000	615,918,000	
1955	2,393,767,000	476,957,000	2,870,724,000	2,419,300,000	30,012,170,000	451,424,000	
1956	2,507,114,000	467,222,000	2,974,336,000	2,551,857,000	30,434,649,000	422,479,000	
NATURAL GAS LIQUIDS ONLY							
1946	(.....)	This detail not available for 1946.		(.....)	3,163,219,000	90,756,000	
1947	192,237,000	59,301,000	251,538,000	160,782,000	3,253,975,000	286,808,000	
1948	405,874,000	64,683,000	470,557,000	183,749,000	3,540,783,000	188,229,000	
1949	294,211,000	92,565,000	386,776,000	198,547,000	3,729,012,000	538,651,000	
1950	707,879,000	58,183,000	766,062,000	227,411,000	4,267,663,000	456,939,000	
1951	648,497,000	75,494,000	723,991,000	267,052,000	4,724,602,000	272,049,000	
1952	475,170,000	81,668,000	556,838,000	284,789,000	4,996,651,000	441,271,000	
1953	648,047,000	95,922,000	743,969,000	302,698,000	5,437,922,000	193,465,000	
1954	20,830,000	86,520,000	107,350,000	300,815,000	5,244,457,000	194,108,000	
1955	447,160,000	67,348,000	514,508,000	320,400,000	5,438,565,000	463,767,000	
1956	715,764,000	94,056,000	809,820,000	346,053,000	5,902,332,000	704,881,000	
TOTAL LIQUID HYDROCARBONS							
1946	(.....)	This detail not available for 1946.		(.....)	24,036,779,000	704,881,000	
1947	2,211,377,000	504,731,000	2,716,108,000	2,011,227,000	24,741,660,000	2,079,567,000	
1948	3,804,600,000	461,164,000	4,265,764,000	2,186,197,000	26,821,227,000	1,557,274,000	
1949	2,591,639,000	982,982,000	3,574,621,000	2,017,347,000	28,378,501,000	1,157,560,000	
1950	2,705,648,000	623,099,000	3,328,747,000	2,171,187,000	29,536,061,000	2,636,572,000	
1951	4,673,195,000	464,750,000	5,137,945,000	2,481,373,000	32,192,633,000	764,572,000	
1952	2,728,030,000	578,096,000	3,306,126,000	2,541,554,000	32,957,205,000	1,425,545,000	
1953	3,352,497,000	687,602,000	4,040,099,000	2,614,554,000	34,382,750,000	422,453,000	
1954	2,308,061,000	672,326,000	2,980,387,000	2,557,934,000	34,805,203,000	645,532,000	
1955	2,840,927,000	544,305,000	3,385,232,000	2,739,700,000	35,450,735,000	886,246,000	
1956	3,222,878,000	561,278,000	3,784,156,000	2,897,910,000	36,336,981,000		

* See note bottom of Table 5A.
† See footnote on page 5.

Report of the Committee on Natural Gas Reserves of the American Gas Association

TO THE BOARD OF DIRECTORS OF THE AMERICAN GAS ASSOCIATION:

The Committee on Natural Gas Reserves herewith submits its eleventh annual report, summarizing the proved recoverable reserves of natural gas and natural gas liquids of the United States, as of December 31, 1956, as follows:

NATURAL GAS RESERVES

(Thousands of Cubic Feet—14.65 psia, at 60° F)

Total proved reserves as of December 31, 1955	223,697,445,000
Extensions and revisions of previous estimate during the year of 1956	19,214,604,000
New reserves discovered in 1956 ...	5,636,476,000
Net changes in underground storage during 1956	133,970,000
Total proved reserves added and net changes in underground storage during 1956	24,985,050,000
Total proved reserves as of December 31, 1955 and additions during 1956	248,682,495,000
Deduct production during 1956	10,907,926,000
Total proved reserves of natural gas as of December 31, 1956	237,774,569,000

Reserves data are shown by states in Table 1.

NATURAL GAS LIQUIDS RESERVES

(Barrels of 42 U. S. Gallons)

Total proved reserves as of December 31, 1955	5,438,565,000
Extensions and revisions of previous estimate during the year of 1956	715,764,000
New reserves discovered in 1956 ...	94,056,000
Total proved reserves added in 1956	809,820,000
Total proved reserves as of December 31, 1955, and new proved reserves added in 1956	6,248,385,000
Deduct production during 1956	346,053,000
Total proved reserves of natural gas liquids as of December 31, 1956	5,902,332,000

Reserves data are shown by states in Table 2.

Table 3 is a summary of the Committee's annual estimates of proved natural gas reserves for the past twelve years, reflecting the changes in the natural gas reserve position in the United States during each of the eleven years since December 31, 1945. Table 4 shows the proved natural gas liquids reserves of the United States for the last eleven years, and the changes which have taken place in these reserves annually since the first estimate was made as of December 31, 1946.

In order to arrive at an estimate of the total proved liquid hydrocarbon reserves in the United States, the reserves of natural gas liquids shown in Table 2 have been added to the reserves of crude oil estimated by the Committee on Petroleum Reserves of the American Petroleum Institute. The total liquid hydrocarbon reserves are shown in Table 4 of the report of the Committee on Petroleum Reserves.

The Committee has continued the practice, begun in the report of December 31, 1948, of reporting the volume of gas in underground storage reservoirs. Since December 31, 1953, these figures have been based on data furnished by the Committee on Underground Storage of the American Gas Association. Prior to the report of December 31, 1953 the native gas remaining in a storage reservoir when injection began was classified and listed, for the most part, as a non-associated natural gas reserve and was not included in the underground storage figure. Beginning with the December 31, 1953 report, all gas, including native and stored gas, is included in the underground storage figures. Adjustments in, withdrawals from, or additions to storage are included in the figures shown under the heading "Net Change in Underground Storage." Changes in underground storage are excluded from the column headed "Net Gas Production." Net gas production is the gross production from producing reservoirs less that gas returned to producing reservoirs in cycling and repressuring projects.

In view of the great diversity of pressure bases specified by different jurisdictions throughout the United States, attention is drawn to the fact that natural gas reserves estimates published in this and previous reports of this Committee have been based on standard conditions of 14.65 psia and 60° F.

The Committee wishes to point out that it is often not possible to estimate the total reserves of a field in the year of its discovery. Satisfactory estimates can be made only after there has been sufficient drilling in the fields and, in some cases, adequate production history established. For these reasons, the reserves listed as discovered during any current year must be considered only as the reserves indicated by the drilling in that year. The reserves of all fields and pools are reviewed and revised upward or downward in each succeeding annual report to reflect additional information on preceding estimates. These changes are shown as "Extensions and Revisions."

The procedure followed in estimating and assembling the proved reserves figures is the same as that used in the past reports. A proved reserve may be in either the drilled or undrilled portion of a given field. When the undrilled area is considered proved, it is so related to the developed acreage and the known field geology and structure that its productive ability is considered assured. Proved recoverable reserves of natural gas are those reserves esti-

mated to be producible under present operating practices, with no consideration being given to their ultimate use. Since the estimates are made by pools, the recovery factors or abandonment pressures used in the calculations are governed by the operating conditions in each individual pool. Proved recoverable reserves of natural gas liquids are those contained in the recoverable gas reserves subject to being produced as natural gas liquids by separators or extraction plants, now in operation, under construction or planned for the immediate future. For purposes of developing reserve estimates, natural gas liquids are defined as those hydrocarbon liquids which are gaseous or in solution with crude oil in the reservoir and which are recoverable as liquids by the processes of condensation or absorption which take place in field separators, scrubbers, gasoline plants, or cycling plants. Natural gasoline, condensate, and liquefied petroleum gases fall in this category. While the liquids so collected and the products derived from them in some of the modern plants are known by a variety of names, they have been grouped together here under the general heading "Natural Gas Liquids."

The estimates presented in this report incorporate the results of carefully detailed studies of many hundreds of fields and pools throughout the United States. Their preparation has required the help and active cooperation of specially trained geologists and engineers familiar with developments in all producing areas throughout the country. The Committee is fortunate to have obtained the help of this group of men who have served as subcommittee members. As in past years, they have given generously of their time and efforts to make these estimates as complete and accurate as possible. The Committee expresses its appreciation to these men.

The Committee also acknowledges the helpful cooperation of the Committee on Petroleum Reserves of the American Petroleum Institute, on whose estimates of crude oil reserves the estimates of dissolved gas reserves are based, and the Committee on Underground Storage of the American Gas Association, who supplied the data on which the underground storage figures are based.

Appended is a list of the subcommittee members.

Respectfully submitted,

COMMITTEE ON NATURAL GAS RESERVES

Members

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W. F. Burke, Lone Star Gas Company
M. M. Fidler, Mountain Fuel Supply Company
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C. C. Hoffman, Cities Service Gas Company
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E. D. Pressler, Humble Oil and Refining Company
E. E. Roth, Columbia Gas System Service Corporation
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C. E. Turner, Phillips Petroleum Company
W. J. N. Whipple, Southern Natural Gas Company
Daniel Parson (*secretary*), American Gas Association

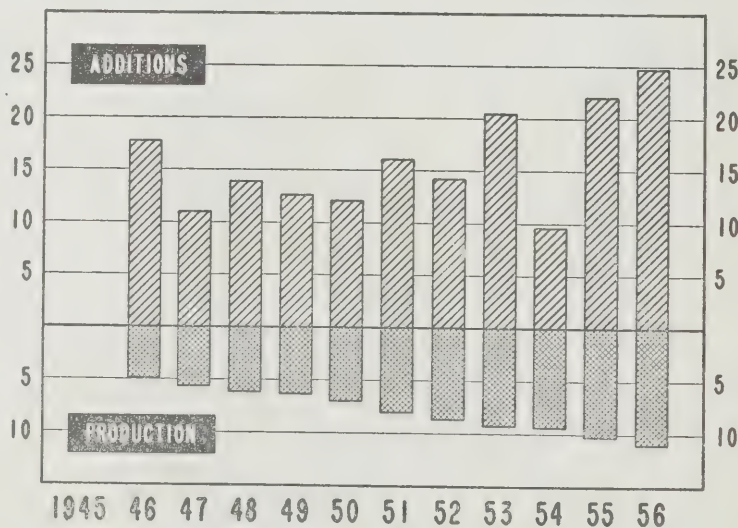
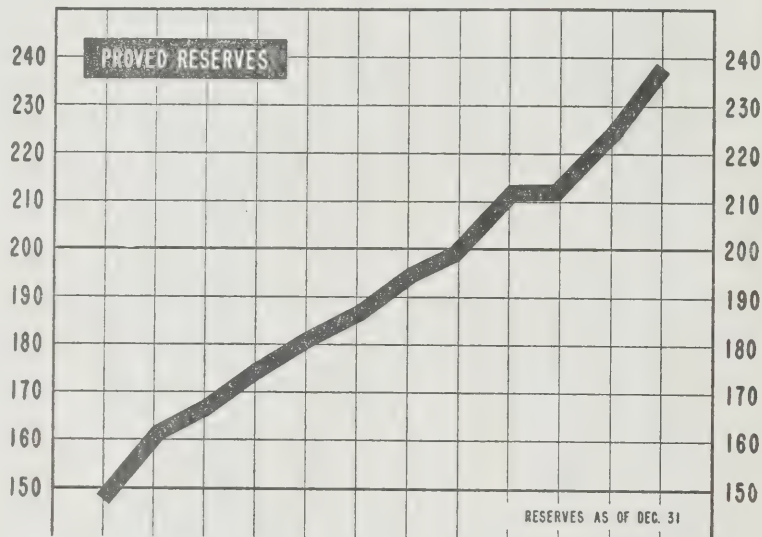
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of the
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AMERICAN GAS ASSOCIATION

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*Gallagher, R. W.	Sloan, R. D.
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Haavik, S. A.	Thomas, W.
Hahn, W. L.	Van Guilder, H. W.
Haig, A.	Vary, J. A.
Halsell, H.	*Whitaker, M. T.
Hauber, F. C.	Wieder, A. H.

* Alternates to committee members.

NATURAL GAS RESERVES UNITED STATES

(TRILLIONS OF CUBIC FEET)



A.C.A. COMMITTEE ON NATURAL GAS RESERVES

TABLE 1

ESTIMATED PROVED RECOVERABLE RESERVES OF NATURAL GAS IN THE UNITED STATES

(Millions of Cubic Feet—14.65 psia, at 60 deg. F.)

Changes in Reserves during 1956						Reserves ^b as of December 31, 1956				
Reserves as of Dec. 31, 1955 ^a (1)	Extensions and Revisions ^b (2)	Discoveries of		Net Change in Under- ground Storage ^c (4)	Net Production ^d (5)	Total (Columns 7 + 8 + 9 + 10, also Column 1 + 2 + 3 + 4, less Column 5) (6)	Non- Associated ^e (7)	Associated ^f (8)	Dissolved ^g (9)	Under- ground Storage ^h (10)
		Extensions and Revisions ^b (2)	New Fields and in Old Fields ^b (3)							
Arkansas.....	1,164,367	2,990	38,457	(—)	551	1,171,527	554,908	323,260	288,762	4,597
California ⁱ	8,892,950	258,495	76,317	11,264	487,798	8,751,233	2,164,272	2,058,459	4,462,694	65,808
Colorado.....	2,253,562	187,523	73,161	3,291	94,768	2,432,769	1,611,749	131,977	675,752	3,291
Illinois.....	233,565	2,574	1,395	7,180	23,009	219,705	5,535	500	186,026	27,644
Indiana.....	33,111	4,289	0	4,77	37,708	37,772	2,050	1,880	22,621	7,221
Kansas.....	16,293,080	1,652,569	195,316	3,042	577,708	17,566,257	17,022,526	146,698	340,400	56,633
Kentucky.....	1,262,270	46,051	7,600	1,681	72,700	1,245,602	1,161,206	6,548,729	62,617	21,779
Louisiana ^j	42,435,592	2,910,172	1,630,589	27,995	1,972,354	45,053,999	35,490,462	20,680	3,014,808	234,092
Michigan.....	325,874	4,562	15,377	1,273	220,231	2,403,326	1,627,795	500,852	272,464	2,215
Mississippi.....	2,608,340	(—)	43,592	1,723	20,218	696,351	549,031	36,203	80,336	30,781
Montana.....	719,719	6,094	718	438	25,378	225,402	121,487	12,608	91,307	0
Nebraska.....	203,421	39,174	8,152	0	64,880	23,472,707	17,052,725	4,694,721	1,673,733	51,528
New Mexico.....	18,584,912	5,222,559	340,232	(—)	33,116	85,249	37,024	0	287	47,938
New York.....	75,760	5,127	1,470	6,877	15,985	397,493	6,307	0	391,186	0
North Dakota.....	280,696	112,270	20,512	29,225	31,727	853,607	532,226	0	37,960	283,421
Ohio.....	809,874	39,845	6,390	4,035	916,620	13,775,049	6,483,823	3,432,600	3,768,640	89,986
Oklahoma.....	13,204,759	1,249,397	234,480	3,753	118,416	776,212	419,111	0	31,165	325,936
Pennsylvania.....	754,359	97,573	2,829,160	2,423	5,334,951	112,728,750	70,801,507	25,580,088	16,329,920	17,235
Texas.....	108,287,348	6,944,630	2,829,160	2,423	5,334,951	112,728,750	70,801,507	25,580,088	16,329,920	17,235
Utah.....	420,896	170,401	46,949	0	18,570	619,786	546,361	19,075	54,350	0
Virginia.....	54,756	2,183	25,230	32,995	182,971	1,561,737	1,288,602	0	64,033	209,102
West Virginia.....	1,504,899	12,544	1,932	109	129,136	3,235,932	2,416,326	186,729	18,219	18,219
Wyoming.....	3,196,103	152,232	1,932	3,889	5,093	80,761	56,727	0	19,225	4,809
Miscellaneous ^k	57,022	11,288	13,655	3,889	5,093	80,761	56,727	0	19,225	4,809
Total.....	223,697,445	19,214,604	5,636,476	133,970	10,907,926	237,774,569	160,032,913	43,695,059	32,544,362	1,502,235

^a Includes Alabama, Arizona, Florida, Iowa, Maryland, Missouri, and Nevada.^b Excludes gas loss due to natural gas liquids recovery.^c The net difference between gas stored in and gas withdrawn from underground storage reservoirs, inclusive of adjustments and native gas transferred from other reserve categories.^d Net production equals gross withdrawals less gas injected into producing reservoirs. Changes in underground storage and gas loss due to natural gas liquids recovery are excluded. Fourth quarter production estimated in some instances.^e Non-associated gas is free gas not in contact with crude oil in the reservoir; and free gas in contact with oil where the production of such gas is not significantly affected by the production of crude oil.^f Associated gas is free gas in contact with crude oil in the reservoir where the production of such gas is significantly affected by the production of crude oil.^g Dissolved gas is gas in solution with crude oil in the reservoirs.^h Gas held in underground reservoirs (including native and net injected gas) for storage purposes.ⁱ Includes off-shore reserves.

TABLE 2
ESTIMATED PROVED RECOVERABLE RESERVES OF NATURAL GAS LIQUIDS IN THE UNITED STATES^a
(Thousands of Barrels of 42 U. S. Gallons)

	Changes in Reserves during 1956				Reserves as of December 31, 1956			
	Reserves as of Dec. 31, 1955 (1)	Extensions and Revisions (2)	Discoveries of New Fields and New Pools in Old Fields (3)	Net Production (4)	Total (Columns 6 + 7 + 8 also Columns 1 + 2 + 3 Less Column 4) (5)	Non- Associated (6)	Associated (7)	Dissolved (8)
Arkansas.....	45,124	338	18	3,013	42,467	12,210	16,212	14,045
California ^d	324,941	16,548	663	30,424	311,728	0	96,117	215,611
Colorado.....	12,511	(—)	0	837	11,545	2,714	0	8,831
Illinois.....	18,457	464	92	2,241	16,772	28	2	16,742
Indiana.....	132	17	5	21	133	10	10	113
Kansas.....	173,236	2,111	1,944	5,676	171,615	166,380	1,374	3,861
Kentucky.....	8,675	291	145	1,860	7,251	7,251 ^e	0	0
Louisiana ^d	935,950	98,628	23,589	43,225	1,014,942	791,284	169,842	53,816
Michigan.....	872	178	134	116	1,068	228	103	737
Mississippi.....	57,876	(—)	1,421	3,079	56,003	29,729	20,552	5,722
Montana.....	6,857	1,550	0	262	8,145	0	735	8,145
Nebraska.....	6,436	436	183	551	6,504	4,859	0	910
New Mexico.....	342,207	84,574	2,489	15,171	414,099	283,464	51,781	78,854
Ohio.....	1,557	120	13	21	1,669	1,669 ^a	0	0
Oklahoma.....	354,354	26,131	5,963	30,860	355,588	116,937	58,398	180,253
Pennsylvania.....	3,024	178	89	124	3,167	3,167 ^e	0	0
Texas ^d	3,045,361	476,364	57,037	198,873	3,379,889	1,346,550	592,196	1,441,143
Utah.....	108	(—)	0	5	95	79	16	0
West Virginia.....	30,526	761	253	4,799	26,741	26,741	0	0
Wyoming.....	50,348	7,420	0	3,894	53,874	16,528	867	36,479
Miscellaneous ^b ..	20,013	7	18	1,001	19,037	18	0	19,019
Total.....	5,438,565	715,764	94,056	346,053	5,902,332	2,809,846	1,008,205	2,084,281

^a Includes condensate, natural gasoline and liquefied petroleum gas.
^b Includes Alabama, Florida, Missouri, and North Dakota.
^c Not allocated by types but occurring principally in the column shown.
^d Includes off-shore reserves.

TABLE 3

SUMMARY OF ANNUAL ESTIMATES OF NATURAL GAS RESERVES FOR PERIOD DECEMBER 31, 1945 TO DECEMBER 31, 1956

(Millions of Cubic Feet—14.65 psia, at 60 deg. F.)

Year	Natural Gas Added during Year			Net Change in Underground Storage	Net Production during Year	Estimated Proved Reserves as of End of Year	Increase over Previous Year
	Extensions and Revisions	Discoveries of New Fields and New Pools in Old Fields	Total of Discoveries, Revisions and Extensions				
1945	—	—	17,729,152	—	—	147,789,367	12,786,534
1946	—	—	10,980,824	—	4,942,617	160,575,901	5,351,013
1947	7,570,654	3,410,170	10,980,824	a	5,629,811	165,926,914	7,942,426
1948	9,769,483	4,129,089	13,898,572	51,482	6,007,628	173,869,340	6,512,004
1949	8,061,429	4,612,870	12,674,299	82,746	6,245,041	180,381,344	5,211,355
1950	9,172,381	2,877,351	12,049,732	54,301	6,892,678	185,592,699	8,218,801
1951	13,013,606	3,039,385	16,052,991	132,751	7,966,941	193,811,500	5,904,725
1952	8,934,470	5,411,043	14,345,513	198,850	8,639,638	199,716,225	11,730,907
1953	13,371,355	7,081,661	20,453,016	516,431 ^b	9,238,540	211,447,132	263,600
1954	4,632,309	4,966,894	9,599,203	90,906	9,426,509	211,710,732	11,986,713
1955	16,298,125	5,719,069	22,017,194	87,637	10,118,118	223,697,445	14,077,124
1956	19,214,604	5,636,476	24,851,080	133,970	10,907,926	237,774,569	

^a Not estimated.^b All native gas in storage reservoirs formerly classified as a natural gas reserve is included in this figure.

TABLE 4

SUMMARY OF ANNUAL ESTIMATES OF NATURAL GAS LIQUIDS RESERVES FOR PERIOD DECEMBER 31, 1946 TO DECEMBER 31, 1956

(Thousands of Barrels of 42 U. S. Gallons)

Year	Natural Gas Liquids Added during Year				Net Production during Year	Estimated Proved Reserves as of End of Year	Increase over Previous Year
	Extensions and Revisions	Discoveries of New Fields and New Pools in Old Fields	Total of Discoveries, Revisions and Extensions				
1946					129,262	3,163,219	—
1947	192,237	59,301	251,538		160,782	3,253,975	90,756
1948	405,874	64,683	470,557		183,749	3,540,783	286,808
1949	294,211	92,565	386,776		198,547	3,729,012	188,229
1950	707,879	58,183	766,062		227,411	4,267,663	538,651
1951	648,497	75,494	723,991		267,052	4,724,602	456,939
1952	475,170	81,668	556,838		284,789	4,996,651	272,049
1953	648,047	95,922	743,969		302,698	5,437,922	441,271
1954	20,830	86,520	107,350		300,815	5,244,457	(—)193,465
1955	447,160	67,348	514,508		320,400	5,438,565	194,108
1956	715,764	94,056	809,820		346,053	5,902,332	463,767

THE 1956 REPORT ON ESTIMATED PROVED RESERVES OF CRUDE OIL AND NATURAL GAS LIQUIDS OF THE CANADIAN PETROLEUM ASSOCIATION

The American Petroleum Institute presents herewith, through the courtesy of the Central Reserves Committee of the Canadian Petroleum Association, the results of that group's 1956 estimate of proved crude oil reserves in the provinces indicated below, and the combined total of natural gas liquids for those provinces. The figures shown are based upon the same method of approach as to definitions, procedures, etc., as is used by the API committee in compiling its estimates of crude oil and natural gas liquids reserves in the United States shown elsewhere in this report.

The Central Reserves Committee is composed of Messrs. G. A. Connell, Royalite Oil Company, Limited, Chairman; R. F. Gilmour, The British American Oil Company, Limited, Vice-Chairman; W. D. Stuart, Canadian Petroleum Association, Secretary; E. E. Cudby, The California Standard Company, and H. F. Nalderett, Imperial Oil, Limited. Others who assisted the Central Committee are listed on the following page.

ESTIMATED PROVED RESERVES OF LIQUID HYDROCARBONS IN CANADA (In 35 Imperial gallon barrels which are equivalent to 42 U. S. gallon barrels)

	Proved Reserves as of December 31, 1955 (1)	Changes in Proved Reserves Due to Extensions (New Oil) and Revisions During 1956 (2)	Proved Reserves Discovered in New Fields and in Old Fields in 1956* (3)	Production During 1956 (4)	Proved Reserves as of December 31, 1956 (Column 1 + 2 + 3 less Column 4) (5)	Changes in Reserves During 1956 (Column 5 less Column 1) (6)
CRUDE OIL						
Northwest Territories	53,707,000	.....	.....	449,000	53,258,000	(—) 449,000
Alberta and British Columbia	2,169,985,000	344,213,000	19,721,000	142,141,000	2,391,778,000	221,793,000
Saskatchewan	236,872,000	113,711,000	28,394,000	20,284,000	358,693,000	121,821,000
Manitoba	45,211,000	2,577,000	56,000	5,839,000	42,005,000	(—) 3,206,000
Ontario and New Brunswick	3,759,000	465,000	20,000	608,000	3,636,000	(—) 123,000
Total Crude Oil	2,509,534,000	460,966,000	48,191,000	169,321,000	2,849,370,000	339,836,000
†Natural Gas Liquids	247,085,000	20,505,000	15,000,000	2,656,000	279,934,000	32,849,000
TOTAL LIQUID HYDROCARBONS IN CANADA	2,756,619,000	481,471,000	63,191,000	171,977,000	3,129,304,000	372,685,000

* Only a limited area is assigned to each new discovery even though the committee may believe that eventually a much larger area will produce, because in this report the committee is concerned only with actually proved reserves. Hence, figures in this column may be considered minimum figures.

† All natural gas liquids located in Alberta and British Columbia.

MEMBERS OF CANADIAN PETROLEUM ASSOCIATION'S SUBCOMMITTEES

(in addition to Central Reserves Committee)

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Eubanks, E. B.
Leeds, B. R.

Moreau, B. L.
Richards, S. B.
(Connell, G. A.)
(Naldrett, H. F.)

Saskatchewan Subcommittee: (Includes Manitoba)

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(Cudby, E. E.)
(Gilmour, R. F.)

Names in parentheses are members of Central Reserves Committee.

